

Salt Structural Deformation and Hydrocarbon Traps in the Tarim Basin, Northwest China

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The Tarim basin is an important petroliferous and salt-bearing basin in China. There are four salt-bearing strata with various thickness from the Paleozoic to the Cenozoic, including: (1) the Lower-Middle Cambrian, mainly distributes in the west part of the North Tarim uplift and Central uplift, (2) the Lower Carboniferous, mainly distributes in the south slope of the North Tarim uplift, (3) the Paleogene, distributes in the middle and west parts of the Kuqa foreland fold-and-thrust belt and North Tarim uplift, and (4) the Neogene, mainly distributes in the east part of the Kuqa foreland fold-and-thrust belt.

The outcrops and interpretation of seismic profiles show that many salt structures are developed well in the Tarim basin, such as salt diapirs, salt nappes, salt pillows, salt walls, salt welds, salt rollers, salt minibasins, salt mountains and fish-tails. Although all the salt sequences are characteristic of viscous flow, the differential salt structural styles exist in different regions, partly because of the different salt thickness and deformation mechanisms. For example, in the Kuqa foreland fold-and-thrust belt, the thick Paleogene salt is mainly controlled by the compressional stresses and differential loading, and the large-scale detachment folds are predominant. In the Central uplift belt, however, the thrust faults on the top of the small-size salt domes are developed well, because of the thin Lower-Middle Cambrian salt.

It has been demonstrated that the large oil and gas fields have close relationship to the salt structural deformation in the Tarim basin, such as Kela-2 gasfield, Tahe oilfield, Dabei gasfield and Dina gasfield. Influenced by the salt structural deformation, there are many structural and subtle traps in the subsalt, salt and suprasalt layers, which offer abundant favorable spaces for hydrocarbon accumulations. Comparatively speaking, the subsalt traps have greater exploration potential.